FSNSA-C

SYNTHESIZED SIGNAL GENERATOR (100 kHz to 2.0 GHz)

1. GENERAL. This procurement requires a programmable synthesized signal generator covering a frequency range of 100 kHz to 2 GHz with internal and external modulation capabilities.

2. CLASSIFICATION. The synthesized signal generator described herein shall meet the requirements of MIL-T-28800, Type III, Class 5, Style E, Color R for the Navy shipboard, submarine, and shore applications with the following exceptions:

a. The relative humidity requirement is limited to 95% noncondensating.

b. The operating and nonoperating altitude requirements are not invoked.

c. The electromagnetic interference requirements of MIL-T-28800 are limited to CE01, CE03, CS01, CS02 (0.5 to 100 MHz), CS06, RE01 (relaxed 20 dB; back panel search excluded), RE02 (14 kHz to 1 GHz), and RS03.

d. The warm-up time is extended to 2 hours.

3. OPERATIONAL REQUIREMENTS. The equipment shall be capable of generating signals within the parameters and accuracies specified herein.

3.1 Frequency characteristics. F = carrier frequency.

3.1.1 Range. At least 100 kHz to 2 GHz.

3.1.2 Resolution. At least 1 Hz.

3.1.3 Stability (CW mode).

3.1.3.1 Internal. $< \pm 2$ pp 10^9/hr.

3.1.3.2 Temperature. < 1 pp 10^7 0-50°C.

3.1.3.3 External. Equal to external standard frequency stability.

3.1.4 Spectral purity. (level ≤ 8 dBm).

3.1.4.1 Harmonics/Subharmonics. At least -30 dBc ($F < 1$ GHz) at least -25 dBc [$F > 1$ GHz).

3.1.4.2 NonHarmonics/Spurious. At least -90 dBc (>15 kHz from carrier).

3.1.4.3 Signal sideband phase noise. ≤ -120 dBc/Hz (at 20 kHz offset).

3.1.4.4 Residual AM. < 0.1% rms (300 Hz to 3 kHz BW).

3.1.4.5 Residual FM. < 10 Hz rms (50 Hz to 15 kHz BW).

3.1.5 Frequency sweep.
3.1.5.1 Type. Linear, stepped.

3.1.5.2 Sweep width. At least 10 kHz to 1 GHz.

3.1.5.3 Step size. At least 1 Hz to 10 MHz.

3.1.5.4 Modes. Manual, auto.

3.1.6 Reference frequency.

3.1.6.1 Internal. 10 MHz.

3.1.6.1.1 Output level. > 0.1 Vrms into 50 ohm BNC female connector.

3.1.6.2 External. 5 or 10 MHz.

3.1.6.2.1 Input level. > 0.5 Vrms into 50 ohm BNC female connector.

3.2 Output characteristics.

3.2.1 Range. +13 to -127 dBm.

3.2.2 Accuracy. Within ±1.5 dB.

3.2.2.1 Resolution. 0.1 dB.

3.2.3 Flatness. ±1 dB (measured at 0 dBm).

3.2.4 Output impedance/connector. 50-ohm; Type-N.

3.2.4.1 VSWR. < 2 (Level < 0 dBm).

3.2.5 Reverse power protection.

3.2.5.1 Max CW power. 25W.

3.2.5.2 Max dc voltage. 25V.

3.3 Modulation characteristics. (F = carrier frequency) Any simultaneous combination of AM, FM, or pulse.

3.3.1 Amplitude modulation (AM). (Level ≤ 0 dBm.)

3.3.1.1 Internal AM. (F > 10 MHz.)

3.3.1.1.1 Rate. At least 20 Hz to 50 kHz synthesized.

3.3.1.1.2 Depth. 0 to 99%.

3.3.1.1.3 Accuracy. ±7% of selected depth (< 90% depth @1 kHz).

3.3.1.1.4 Distortion. ≤ 5% (50% depth @1 kHz).

3.3.1.1.5 Incidental ?? M. < 0.3 radians (30% depth @ 1 kHz), (50 Hz to 15 kHz BW).

3.3.1.2 External AM. (F > 10 MHz.)

3.3.1.2.1 Rate. At least 20 Hz to 50 kHz.

3.3.1.2.2 Depth. 0 to 99%.

3.3.1.2.3 Sensitivity. < 1 Vpk (produce selected depth within 10%).

3.3.1.2.4 Distortion. ≤ 5% (50% depth @ 1 kHz).

3.3.1.2.5 Input impedance. 600Ω.

3.3.2 Frequency modulation (FM). (ΔF = FM deviation).

3.3.2.1 Internal FM. (F > 10 MHz).

3.3.2.1.1 Rate. At least 20 Hz to 100 kHz synthesized.

3.3.2.1.2 Deviation. At least 0 to 100 kHz.

3.3.2.1.3 Accuracy. ±6% of set value + 20 Hz (50 Hz to 25 kHz rate).

3.3.2.1.4 Distortion. ≤ 3% [F = 20 kHz @ 1 kHz]

3.3.2.2 External FM. (F > 10 MHz.)

3.3.2.2.1 Rate. At least DC to 100 kHz.

3.3.2.2.2 Deviation. At least 0 to 100 kHz.

3.3.2.2.3 Distortion. ≤ 3% (ΔF = 20 kHz @ 1 kHz).

3.3.2.2.4 Incidental AM. < 1% (ΔF = 20 kHz @ 1 kHz), (50 Hz to 15 kHz BW).

3.3.2.2.5 Input impedance. 600Ω.

3.3.3 Pulse modulation (PM).

3.3.3.1 External PM [F> 10 MHz]

3.3.3.1.1 Rate. At least 20 Hz to 1 MHz

3.3.3.1.2 Level accuracy. ≤ ± 2 dB

3.3.3.1.3 Min pulse width. < 500 nsec

3.3.3.1.4 ON/OFF ratio. > 80 dB

3.3.3.1.5 Rise/Fall time. < 100 nsec

3.3.3.1.6 Level. > 3 Vpk ON; < 1 Vpk OFF

3.3.3.1.7 Input impedance. 50 ohms or 600 ohms

3.3.4 Internal Modulation Source (Synthesized)

3.3.4.1 Rates. 1. Hz to 100 kHz

3.3.4.2 Accuracy/Stability. Same as reference

3.3.4.3 Resolution. At least 3 digits

3.3.4.4 Level. 0 to 2 Vpeak

3.3.4.5 Output impedance. 600 ohms

4. GENERAL REQUIREMENTS

4.1 Power. 115/230 Vac ±10%, single phase, 50-60 Hz ±5%, 400 VA maximum

4.2 Dimensions. The total volume of the unit shall not exceed 49200 cm^3 (3000 in^3).

4.3 Weight. The total weight of the unit shall not exceed 31.8 kg (70 lbs).

4.4 Calibration interval. The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.5 Remote programming. The generator shall be capable of being remotely controlled via the IEEE-488( ) interface bus, operating as both a talker and listener, having at least the following subset of bus functions: AH1, L4, SH1, T6, SR1, DC1, and RL1.